KENNEDY SPACE CENTER   DATE: December 28, 1967
Apollo Program Directive

KSC APOLLO PROGRAM DIRECTIVE NO. 11-A

TO   : Distribution   FROM: R. O. Middleton
                                                    Apollo Program Manager

SUBJECT: Preparation and Management of Kennedy Space Center Test and Checkout
          Plans and Procedures

I.   PURPOSE

This Program Directive covers the development, implementation and management of Test and
Checkout Plans and Procedures utilized in the preparation and launch of Apollo-Saturn
space vehicles at KSC.

II. SCOPE

This Directive defines the requirements, responsibilities and coordination necessary for
the development, revision, and execution of Test and Checkout Plans and Procedures for
the preparation and launch of Apollo-Saturn space vehicles at KSC.

III. REFERENCE*

Apollo Program Directive No. 26-B, Subject: Preparation of Test and Checkout Plans and
Procedures at KSC, dated December 6, 1967.

IV. APPLICABILITY

This Directive is effective for all subsequent Apollo-Saturn missions except that the use
of standardized titles for Test and Checkout Plans and Test and Checkout Procedures shall
be effective for AS-205, AS-503, and subsequent missions.

V.   GENERAL*

The Kennedy Space Center has been instructed, by Apollo Program Directive No. 26-B to
revise the present system of inter-Center vehicle hardware test requirements and test
procedures documentation.

The above mentioned Directive designates two documents that KSC will be utilizing in this
new approach. They are "Test and Checkout Plans" and "Test and Checkout Procedures."
These documents are defined and associated responsibilities are detailed in the subse-
quent sections of this Directive.

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This Directive is not intended to alter the provisions for obtaining operational test support as defined in KMI 8660.2.

VI. TEST AND CHECKOUT PLAN

* A. DEFINITION

The Test and Checkout Plan will be KSC's response to the Development Center's Test and Checkout Requirements Document. This Test Requirements Document is due to KSC four months prior to scheduled flight hardware delivery. The Test and Checkout Requirements Document is described in the above referenced Apollo Program Directive. The KSC Test and Checkout Plan will include an outline for accomplishing Development Center Test and Checkout Requirements at the launch site. It will also include any additional test requirements KSC considers necessary to verify launch facility interface and compatibility with the Mission Control Center-Houston, manned space flight network and launch crew readiness or to satisfy range and safety requirements. The Test and Checkout Plan will also include, as a minimum, the following information:

1. A flow plan designating the sequence of tests to be performed.

2. Identification of the test facilities involved in the overall test flow.

3. Cross reference index to the Development Center Test and Checkout Requirements.

4. A system to readily identify revisions.

5. Specific outline for each test will include:

    a. Test title and procedure number.

    b. Test objectives.

    c. Test location and facility.

    d. Test description in sufficient detail to define the procedure in outline form.

    * e. Flight hardware and GSE configuration requirements.

    f. Significant support requirements. Only in summary, specific support requirements are to be submitted via R.D. Ref. KMI 8660.2.

g. Identification of any hazardous operations.

h. Safety requirements, including any special equipment, personnel procedures or training required for the test.

i. A cross reference to the Development Center Test Requirements where applicable.

j. Software requirements. (Programs utilized during testing)

k. Identify organizations outside of KSC that will be involved.

NOTE: The information contained in this outline is not intended to duplicate the KSC Requirements Document (RD). To avoid this duplication, the outline will reference the RD where applicable.

6. A detailed list of deviations from the Development Center Test Requirements and reasons for these deviations.

B. RESPONSIBILITIES

1. The Director of Launch Operations will be responsible for the preparation, execution and coordination within KSC of this document. Technical coordination with the appropriate Development Center should be accomplished during the preparation phase.

Upon signature approval, by the Director of Launch Operations, the document and four copies, will be submitted to the Apollo Program Manager. This submittal will be accomplished a minimum of eight weeks prior to scheduled flight hardware delivery.

2. The Apollo Program Manager will review the Plan and take necessary action to insure:

a. Compatibility with overall program milestones.

b. Compatibility with ICD's and Launch Operation Panel planning.

c. Compatibility with POP Budget requirements, and input into future budget planning.

d. Compatibility with Center resources.

e. Compatibility with safety regulations.

f. Compatibility with Apollo R & QA requirements.

Upon completion of appropriate actions by the Program Office, the Apollo Program Manager will approve and forward this Document to the appropriate Development Center Program Office six weeks prior to scheduled flight hardware delivery.

All Development Center comments should be received formally by the Apollo Program Manager a minimum of four weeks prior to flight hardware delivery. The Apollo Program Manager will be responsible for assuring the integration of these comments into the TEst and Checkout Plans.

C. CHANGE PROCESS

The Director of Launch Operations will have the authority to make changes to this Document after flight hardware delivery. These changes are to be limited to changes that do not:

1. Affect the schedule.

2. Impact Center resources.

3. Change inter-Center interfaces (ICD's).

4. Deviate from the Development Center Test Requirements, Test and Checkout Specification criteria, Launch Mission Rules, or safety regulations.

5. Deviate from the intent of the current Test and Checkout Plan.

The Director of Launch Operations will have the responsibility to notify the Apollo Program Manager and the appropriate Development Center personnel of such changes.

Changes outside this scope will be submitted by the Director of Launch Operations to the Apollo Program Manager for review, appropriate action and approval.

* All requests for changes to the Test and Checkout Plan originating outside KSC will be addressed to the Apollo Program Manager.

* VII.   TEST AND CHECKOUT PROCEDURES

  A. DEFINITION

  Test and Checkout Procedures shall define the detailed step-by-step sequence of
  events in a specific test and shall be generated for each test associated with
  preparation and launch of flight hardware.

  B. RESPONSIBILITIES

  1. All Directorates shall be responsible for:

  a. Insuring that all Test and Checkout procedures under their cognizance for:
      (1) Operational Checkout of Flight Hardware; (2) Functional verification
      and operational control of GSE; and (3) Operational instructions to
      service, handle and transport end item Flight Hardware during prelaunch
      and launch operations, are forwarded to the KSC Safety Office for approval
      prior to use. (Ref. KMI 1710.13)

  b. Insuring that Technical Procedures, under their cognizance (1) authorize
      work; (2) provide Engineering instructions; and (3) establish methods of
      work, are reviewed and hazardous operations are marked. These procedures
      marked hazardous will be forwarded to the KSC Safety Office for approval
      prior to usage (Ref. KMI 1710.13)

  2. The Director of Launch Operations shall be responsible for:

  a. The preparation, execution, revision, control and management of launch
      site Test and Checkout Procedures. He will make final determination that
      Test and Checkout Procedures are adequate, safe and in accordance with
      the Development Center's Test and Checkout Requirements, Test and Check-
      out Specifications and Criteria, Flight Crew Procedures, Launch Mission
      Rules, and Safety Regulations. He is responsible for obtaining waivers
      and deviations from the above, as defined within this Directive.

  b. Securing written coordination of MSC designated personnel on Test and
      Checkout Procedures and changes thereto and the pre-test reviews of
      spacecraft hardware and Test and Checkout Procedure compatibility for
      those tests in which the flight crew has a requirement to participate.

  c. Providing approved Test and Checkout Procedures to appropriate KSC, MSC,
      and MSFC personnel one month prior to the start of a test and assuring
      expeditious distribution of changes thereto.

d. Assuring that the Launch Site Test and Checkout Procedures are compatible with the Test and Checkout Plans. Any proposed deviations must be coordinated with the KSC Apollo Program Manager.

3. The KSC Safety Office will be responsible for determining which tests are hazardous and assuring that all operations are compatible with overall safety criteria. The Safety Office will be responsible for:

a. Developing overall criteria for determining hazardous operations and assuring the appropriate distribution of this criteria.

b. Reviewing and approving all Test and Checkout Procedures as defined in VII B.1.a.

c. Reviewing and approving all hazardous technical procedures as defined in VII B.1.b.

4. The Apollo Program Manager will be responsible for securing MSC and MSFC signature approval on the safety hazard criteria developed by the KSC Safety Office.

C. GUIDELINES

The following guidelines shall be used in the preparation, revision and execution of KSC Test and Checkout Procedures:

1. Factory or test site Test and Checkout Procedures which have been approved by the development organization shall be used as a baseline where applicable in the development of KSC Test and Checkout Procedures. Whenever possible, Test and Checkout Procedures written for use in the factory will be modified for use at KSC to fit unique facility requirements, safety considerations, integrated space vehicle test requirements and to meet the objectives of the Test and Checkout Plan. To the extent practicable, the overall test sequence shall permit correlation of data between factory and launch site testing for critical flight hardware components.

2. Test and Checkout Procedures shall be standardized in regard to the following items:

a. Major policy and procedure matters regarding preparation, review, approval, and change cycle.

b. Control, approval level and documentation of trouble shooting during the conduct of Test and Checkout Procedures.

c. Extent of quality control participation and sign-off during execution of Test and Checkout Procedures.

d. Recording and approval level for deviations encountered during implementation of Test and Checkout Procedures.

e. Policy concerning multiple effectivity of Test and Checkout Procedures.

f. Inclusion or exclusion of preparation steps in Test and Checkout Procedures.

g. Recording of OIS channels during execution of Test and Checkout Procedures.

h. Appropriate use of warning and caution notes.

* i. Extent of safety and medical organization participation. (See NMI 8900.1)

3. MSC is required to deliver the approved flight crew procedures to KSC at least 40 days prior to a Test or Checkout operation involving the flight crew. Flight Crew Procedures as approved and published by MSC shall be used by KSC when applicable in preparing those Test and Checkout Procedures involving the Flight Crew. In any cases where incompatibility between Test and Checkout Procedures and Flight Crew Procedures exists, KSC will obtain MSC approval of the Test and Checkout Procedures.

4. All Test and Checkout Procedures shall contain or provide specific reference to written instructions for identifying emergency situations, safing of hardware and emergency actions required to evacuate or safe-guard personnel and combat or limit the extent of the damage should an emergency arise.

5. Test and Checkout Procedures shall be provided to the Launch Vehicle or Spacecraft Quality Surveillance Division for review and use in preparing for participation in Test and Checkout operations.

6. Prior to initiation of a test, briefings shall be conducted for all key members of the test team to review the sequence of test activities, the Test and Checkout Procedures and any hazardous operations or emergency procedures.

7. The Flight Crew will use Test and Checkout Procedures when participating in Flight Hardware Tests at the launch site. Flight Crews shall come under KSC control during the time they are actively participating in tests of flight vehicles except that the Flight Crew may take any action necessary for its safety that does not endanger the launch support crew. Deficiencies encountered by the Flight Crew while participating in launch site tests shall be recorded and dispositioned using the same documentation system as that used by the test team.

8. KSC will make an analysis of Test and Checkout Procedures deviations subsequent to completion of major tests for the purpose of reducing deviations in subsequent Test and Checkout Procedures.

9. Tests involving hazardous operations shall not be conducted unless communications are adequate to support emergency operations.

10. MSC and MSFC may exercise an option to review Test and Checkout Procedures as deemed necessary. Any recommended changes will be provided to KSC no later than 15 days prior to the start of the test.

11. MSC Flight crew and flight control personnel will be integrated into the KSC test team for those tests in which they have a requirement to participate.

* 12. Test and Checkout Procedures involving human test subjects shall be coordinated with medical personnel for assurance that potential risks to the health of test subjects are minimized. (See NMI 8900.1)

D. CONTROL SYSTEM

A Test and Checkout Procedure control system shall be established which places strict and positive control over changes subsequent to the distribution of approved copies to the test team. Only those changes in spacecraft, launch vehicle or space vehicle test and checkout procedures which will improve safety or are mandatory because of late changes in hardware configuration shall be approved in the last seven calendar days before scheduled start of a test, unless approved by the following organization level for the tests indicated below:

1. Launch Operations Manager

   a. Flight Readiness

   b. Countdown Demonstration

   c. Countdown

2. Test Supervisor

   a. CSM or LM altitude chamber tests in MSOB

   b. CSM or LM final integrated systems test in MSOB

   c. CSM or LM integrated test in VAB or on pad prior to mating with space vehicle.

d. L/V overall tests 1 and 2 in VAB or on pad.

e. S/V overall tests 1 and 2 in VAB or on pad

f. S/C or L/V propellant loading on pad

g. S/V simulated flight in VAB or on pad

h. Pyrotechnic installation in VAB or on pad

The Director of Launch Operations will establish this organization level for all tests not listed above.

E. REVISIONS

Revisions to Test and Checkout Procedures shall be provided to test team members at least 48 hours in advance of the start of the test. Waivers to this requirement shall be approved at the organizational levels established in the previous section.

F. AUTHORITIES

1. Prior to initiating a test a review will be made of all open work recorded against the hardware of interfacing systems which are to be tested. A determination shall be made that the hardware (including GFE) is properly configured and that the Test and Checkout Procedures, Flight Crew Procedures and hardware are compatible. This determination shall be recorded and approved by KSC and contractor organizations involved in the test. For spacecraft hardware tests involving flight crew participation, this determination shall have signature approval of MSC.

2. Approval to initiate any test involving a hazardous operation shall require approval at the organizational level established in Section VII-D of this Directive, and approval of the KSC Safety Office.

3. Test and Checkout Procedures for tests involving flight crew participation shall have signature approval of MSC.

4. The Director, MSC, and the Director, MSFC, shall delegate the authority either to KSC or to the appropriate official of their own organizations to approve real time deviations to Test and Checkout Procedures involving compromise in test and checkout requirements.

   However, these real time changes will be documented subsequent to the testing and forwarded to the appropriate Development Center through the proper Program channels.